AMENDMENTS TO THE CLAIMS

The following Listing of Claims replaces all prior versions and listings of claims in the present application.

Listing of Claims:

1. (Canceled)

2. (Currently Amended) Device for health monitoring of an area of a structural element comprising at least one dielectric material of dielectric permittivity ε_r comprising:

(A) means of emission of electromagnetic radiation extending in a direction, the electromagnetic field generating an electric field in the area,

(B) detection means suitable for measuring a first measured component of an electric field, along a first direction of detection, and

(C) calculation means suitable for obtaining a value of the dielectric permittivity ε_r in the area on the basis of the first measured component ~~Device according to Claim 1~~, in which the [[said]] structural element is an inhomogeneous structural element ~~furthermore~~ comprising an imperfectly conducting material, of electrical conductivity σ, in which the means of emission [[are]] is means of emission of magnetic radiation that [[are]] is suitable for generating a magnetic field, the [[said]] magnetic field being, at the area, equivalent to a magnetic field emitted by a magnetic dipole extending in the [[said]] direction, and in which the calculation means ~~(C) are~~ is furthermore suitable for obtaining a value of the electrical conductivity σ in the [[said]] area on the basis of the [[said]] first measured component.

3. (Currently Amended) Device according to Claim 2, in which the [[said]] detection means [[are]] is suitable for furthermore measuring a second measured component of the [[said]] electric field, along a second direction of detection forming with the [[said]] first direction of detection a nonzero angle, and in which, the calculation means [[are]] is suitable for obtaining a value of the electrical conductivity σ and of the electrical permittivity ε_r in the [[said]] area on the basis of the [[said]] first and the [[said]] second measured components.

4. (Currently Amended) Device according to Claim 3, in which a direction chosen from the first and the second direction of detection is the [[said]] direction of means of emission.

5. (Currently Amended) Device according to Claim 2, in which the [[said]] means of emission comprises a layer comprising, at the [[said]] area, at least two parallel conducting tracks, oriented along the [[said]] dipole direction and suitable for being able to be traversed in mutually opposite senses by an electric current.

6. (Currently Amended) Device according to Claim 3, in which the [[said]] detection means comprises a layer comprising, at the [[said]] area, at least one conducting track oriented along the [[said]] first direction of detection, and a layer comprising, at the [[said]] area, at least one conducting track oriented along the [[said]] second direction of detection.

7. (Currently Amended) Device according to Claim 2, in which the calculation means comprises:

(Z) memory means suitable for containing a model of the area by at least two numerical parameters related to σ^s representing the [[said]] electrical conductivity σ in this area, and ε_r^s representing the [[said]] dielectric permittivity in this area, and a model of the [[said]] means of emission,

(E) estimation means suitable for estimating a simulated component of a simulated electric field generated in the [[said]] model of the area by the [[said]] model of means of emission, along the [[said]] first direction of detection, and

(F) comparison means suitable for comparing the [[said]] simulated component and the [[said]] corresponding measured component obtained by the means of detection (B).

8. (Currently Amended) Device according to Claim 3, in which the calculation means comprises:

(Z) memory means suitable for containing a model of the area by at least two numerical parameters related to σ^s representing the [[said]] electrical conductivity σ in this area, and ε_r^s representing the [[said]] dielectric permittivity in this area, and a model of the [[said]] means of emission,

(E) estimation means suitable for estimating a first and a second simulated component of the [[said]] simulated electric field along the [[said]] first and second directions of detection, and

(F) comparison means suitable for comparing the [[said]] simulated components and the [[said]] corresponding measured components obtained by the detection means (B).

9. (Currently Amended) Device according to Claim 7 furthermore comprising (D) generating means suitable for generating the [[said]] model contained in the memory means (Z).

10. (Currently Amended) Device according to Claim 2, furthermore comprising

(G) a database containing data relating to an energy absorbed by a structural element exhibiting an electrical conductivity σ and a dielectric permittivity ε_r for the [[said]] materials.

11. (Original) Device according to Claim 2, furthermore comprising a layer for integrated monitoring of the structures based on piezoelectric technology.

12. (Currently Amended) Device according to Claim [[1]] 2 in which the [[said]] structural element comprises no imperfectly conducting material,

and in which the means of emission [[are]] is means of emission of electrical radiation that [[are]] is suitable for generating an electric field extending in the [[said]] direction.

13. (Canceled)

14. (Currently Amended) Structure suitable for health monitoring of an area of a structural element of the structure, and comprising:

at least one dielectric material of dielectric permittivity ε_r,

an electromagnetic radiation emission layer extending in a direction, the electromagnetic field generating an electric field in the area,

a detection layer suitable for measuring a first measured component of an electric field, along a first direction of detection, and

at least one facility for connection to a calculation means suitable for obtaining a value of the dielectric permittivity ε_r in the area on the basis of the first measured component, ~~Structure according to Claim 13~~ in which the [[said]] structural element is an inhomogeneous structural element ~~furthermore~~ comprising an imperfectly conducting material, of electrical conductivity σ, in which the means of emission [[are]] comprises means of emission of magnetic radiation that [[are]] is suitable for generating a magnetic field, the [[said]] magnetic field being, at the area, equivalent to a magnetic field emitted by a magnetic dipole extending in the [[said]] direction, and in which the calculation means ~~(C) are~~ is alternatively suitable for obtaining a value of the electrical conductivity σ in the [[said]] area on the basis of the first measured component.

15. (Currently Amended) Structure according to Claim [[13]] 14, the [[said]] structural element taking the form of at least one layer, the [[said]] detection layer being disposed between the [[said]] structural element layer and the [[said]] emission layer.

16. (Currently Amended) Structure according to Claim [[13]] 14, the [[said]] structural element taking the form of at least one layer, the [[said]] emission layer being disposed between the [[said]] structural element layer and the [[said]] detection layer.

17. (Currently Amended) Structure according to Claim [[13]] 14, the [[said]] structural element taking the form of at least one layer, the [[said]] structural element layer being disposed between the [[said]] emission layer and the [[said]] detection layer.

18. (Currently Amended) Structure according to Claim 14, the [[said]] inhomogeneous structural element taking the form of at least one fine layer comprising at least one imperfectly conducting material in the form of at least one carbon fibre, of electrical conductivity σ, and one dielectric material in the form of a matrix of dielectric permittivity ε_r, in which the [[said]] carbon fibres are embedded.

19. (Canceled)

20. (Currently Amended) Method for health monitoring of an area of a structural element comprising at least one dielectric material of dielectric permittivity ε_r, the method comprising:

(a) generating an electromagnetic field by means of emission of electromagnetic radiation extending in a direction, the electromagnetic field generating an electric field in the area,

(b) generating a magnetic field by means of emission of magnetic radiation while generating the electromagnetic field, the magnetic field being, at the area, equivalent to a magnetic field emitted by a magnetic dipole extending in the direction;

(c) measuring a first measured component of an electric field along a first direction of detection by means of detection means, and

(d) obtaining at least one of a value of the dielectric permittivity ε_r in the area or a value of the electrical conductivity σ in the area on the basis of the first measured component by means of calculation means ~~Method according to Claim 19~~, in which the [[said]] structural element is an inhomogeneous structural element ~~furthermore~~ comprising an imperfectly conducting material, of electrical conductivity σ[[,]].

~~in which, during step (a), a magnetic field is generated by means of emission of magnetic radiation, the said magnetic field being, at the area, equivalent to a magnetic field emitted by a magnetic dipole extending in the said direction,~~

~~and in which during step (c), a value of the electrical conductivity σ in the said area is alternatively or furthermore obtained on the basis of the said first measured component~~.

21. (Currently Amended) Method according to Claim [[19]] 20, in which, during first iteration, steps (a) to (c) are performed for a first frequency of the emission means,

during a second iteration, steps (a), (b) and (c) are repeated for a second frequency, and

during step (c) of the second iteration, the value obtained during step (c) of a previous iteration is taken into account.

22. (Currently Amended) Method according to Claim 20, in which, during each step (b), a second measured component of the [[said]] electric field is furthermore measured, along a second direction of detection forming with the [[said]] first direction a nonzero angle,

and in which, during step (c) of each iteration, the [[said]] first and second measured components are taken into account.

23. (Currently Amended) Method according to Claim 20, in which, during step (c), for each iteration,

furnished, in memory means, with an initial model of the area by at least two numerical parameters related to σ^s representing the [[said]] electrical conductivity σ in this area, and ε_r^s representing the [[said]] dielectric permittivity in this area, and a model of the [[said]] emission means,

(e) at least one first simulated component of a simulated electric field generated in the [[said]] model of the area by the [[said]] model of means of emission is estimated, along a direction of detection chosen from the [[said]] first and second direction of detection, and

(f) the [[said]] simulated component and the [[said]] corresponding measured component obtained during step (b) are compared.

24. (Currently Amended) Method according to Claim 23, furthermore comprising, prior to step (e), a step (d) in which an initial model of the area by at least two numerical parameters related to σ^s representing the [[said]] electrical conductivity σ in this area, and ε_r^s representing the [[said]] dielectric permittivity in this area, and a model of the [[said]] means of emission, are generated in the memory means.

25. (Currently Amended) Method according to Claim 23, in which, during step (b), a second measured component of the [[said]] electric field is measured, along the other direction of detection,

in which, during step (e), a second corresponding simulated component of the [[said]] simulated electric field is estimated,

and in which, during step (f), the [[said]] second simulated component and the [[said]] second measured component obtained during step (b) are compared.

26. (Currently Amended) Method according to Claim 23, in which, subsequent to step (f), step (d') is furthermore implemented, in which a modified model of the area is generated by at least two numerical parameters related to σ^s representing the [[said]] electrical conductivity σ in this area, and ε_r^s representing the [[said]] dielectric permittivity in this area, differing from the initial model through at least one of the numerical parameters, and steps (e) and (f) are implemented for the [[said]] modified model.

27. (Currently Amended) Method according to Claim 23, in which step (c) furthermore comprises a step (g) during which at least one characteristic of the area chosen from the conductivity σ and the permittivity ε_r is determined by identifying the [[said]] simulated conductivity σ^s with the [[said]] conductivity and/or the [[said]] simulated permittivity ε_r^s with the [[said]] permittivity, as soon as the comparison performed in step (f) gives a satisfactory result.

28. (Currently Amended) Method according to Claim 20, furthermore comprising a step during which

(h) an energy absorbed by the [[said]] structural element exhibiting the [[said]] electrical conductivity σ and/or the [[said]] dielectric permittivity ε_r that are obtained in step (c) is determined by inference on a database containing data pertaining to an energy absorbed by a structural element exhibiting an electrical conductivity σ and a dielectric permittivity ε_r for the [[said]] materials.

29. (Currently Amended) Method according to Claim 20 in which the [[said]] structural element comprises no, even imperfectly, electrically conducting material, in which, during step (a), an electric field is generated in the area, in the [[said]] direction, with the aid of means of emission of electrical radiation.

30. (Currently Amended) Method according to Claim 29, in which, during step (c),

furnished, in memory means (3), with an initial model of the area by at least one numerical parameter related to ε_r^s representing the [[said]] dielectric permittivity in this area, and a model of the [[said]] means of emission,

(d) a simulated component of a simulated electric field induced in the [[said]] model of the area by the [[said]] model of means of emission is estimated, and

(e) the [[said]] simulated component and the [[said]] corresponding measured component obtained during step (b) are compared.